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Job Hazard Analysis

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JOB HAZARD ANALYSIS

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CONTENTS

CONTENT	PAGE
Introduction	1
Selecting the job	1
Breaking the job into basic steps	2
Identifying potential hazards	3
Determining preventive measures	4
Conclusion	6
Further reading	8
Annex A – Job hazard analysis worksheet	9

Introduction

In carrying out their tasks at work, what workers don't know can hurt them. In the realm of work procedures, one way to increase knowledge of hazards is to conduct job hazard analyses on individual tasks. A job hazard analysis (JHA) is a procedure which provides for the integration of accepted safety and health principles and practices into a particular operation. In a JHA, each basic step of the job is examined to identify potential hazards and to determine the safest way to do the job. Other terms used to describe this procedure are job safety analysis (JSA) and job hazard breakdown.

Some individuals prefer to expand the analysis into all aspects of the job, not just safety. This approach, known as total job analysis, job analysis or task analysis, is based on the idea that safety is an integral part of every job and not a separate entity. In this document, only health and safety aspects will be considered.

The terms 'job' and 'task' are commonly used interchangeably to mean a specific work assignment, such as 'operating a grinder', 'using a pressurized water extinguisher' or 'changing a flat tire'. JHAs are not suitable for jobs defined too broadly, for example, 'overhauling an engine'; or too narrowly, for example, 'positioning car jack'.

Four basic stages in conducting a JHA are:

1. selecting the job to be analyzed,
2. breaking the job down into a sequence of steps,
3. identifying potential hazards and
4. determining preventive measures to overcome these hazards.

Each of these stages will now be discussed in more detail.

Selecting the job

Ideally, all jobs should be subjected to a JHA. In some cases there are practical constraints posed by the amount of time and effort required to do a JHA. Another consideration is that each JHA will require amendment whenever equipment, raw materials, processes or the environment change. For these reasons, it is usually necessary to identify which jobs are to be analyzed. Even if analysis of all jobs is planned, this step ensures that the most critical jobs are examined first.

Factors to be considered in assigning a priority for analysis of jobs include:

1. Accident frequency and severity – jobs where accidents occur frequently or where accidents occur infrequently but result in disabling injuries.

Selecting the job
continued

2. Potential for severe injuries - the consequences of an accident are potentially severe.

3. Newly established jobs - due to lack of experience in these jobs, hazards may not be evident.

4. Modified jobs - new hazards may be associated with changes in job procedures.

5. Infrequently performed jobs - workers may be at greater risk when undertaking non-routine jobs, and a JHA provides a means of reviewing hazards.

Breaking the job into basic steps

After a job has been chosen for analysis, the next stage is to break the job into steps. A job step is defined as a segment of the operation necessary to advance the work. See examples below.

Care must be taken not to make the steps too general, thereby missing specific steps and their associated hazards. On the other hand, if they are too detailed, there will be too many steps. A rule of thumb is that most jobs can be described in less than ten steps. If more steps are required, consideration might be given to dividing the job into two segments, each with its separate JHA, or to combining steps where appropriate. An example of steps with the right level of detail in analyzing the job of changing a tire is shown below.

An important point to remember is to keep the steps in their correct sequence. Any step which is out of order may invalidate the analysis by missing potential hazards or by introducing hazards which do not actually exist.

Each step is recorded in sequence, noting what is done, rather than how it is done. Each item is started with an action verb. Annex A illustrates a format which can be used as a worksheet in preparing a JHA. Job steps are recorded in the left hand column, as shown below:

Sequence of Steps	Potential Accidents or Hazards	Preventive Measures
1. Park vehicle.		
2. Remove spare and tool kit.		
3. Pry off hub cap and loosen lug bolts (nuts).		
4. and so on...		

Breaking the job into basic steps
continued

This part of the analysis is usually prepared by observing a worker doing the job. The observer is normally the immediate supervisor, but a more thorough analysis results from having an additional person, preferably a member of the joint occupational health and safety committee, participate in the observation. Key points are less likely to be missed in this way.

The worker to be observed should be experienced and capable in all facets of the job. To foster full co-operation and participation, the reason for the exercise must be clearly explained. The JHA is neither a time and motion study in disguise, nor an attempt to uncover individual unsafe acts. The job, not the individual, is being studied in an effort to make it safer by identifying hazards and making modifications to eliminate or reduce them. The worker's experience can be important in making improvements.

The normal conditions under which a job is performed should apply during the period of observation. For example, if a job is routinely only done at night, the JHA scrutiny should also be conducted at night when typical light levels prevail. Similarly, only standard tools and equipment should be used. The only difference from normal operations is the fact that the worker is being observed.

When completed, the breakdown of steps should be discussed by all the participants (always including the worker) to ensure that all basic steps have been noted, in the correct sequence.

Identifying potential hazards

Once the basic steps have been recorded, potential hazards must be identified at each step. Based on observations of the job, knowledge of accident causes, personal experience and imagination, the things that could go wrong are listed at each step. Use Murphy's Law (if anything can go wrong, it will) when looking for potential hazards.

A second observation of the job being performed may be advantageous. Since the basic steps have already been recorded, more attention can now be focussed on potential hazards. At this stage, no attempt is made to solve any problems which may have been detected.

To assist in identifying potential hazards, the job analyst uses questions such as these (not an exhaustive list):

- Can any body part get caught in or between objects?
- Do tools, machines or equipment present any hazards?
- Can the worker make harmful contact with objects?
- Can the worker slip, trip or fall?
- Can the worker suffer strain from lifting, pushing or pulling?
- Is the worker exposed to extreme heat or cold?

Identifying potential hazards
continued

- Is excessive noise or vibration a problem?
- Is there a danger from falling objects?
- Is lighting a problem?
- Can weather conditions affect safety?
- Is harmful radiation a possibility?
- Can contact be made with hot, toxic or caustic substances?
- Are there dusts, fumes, mists or vapours in the air?

Potential hazards are listed in the middle column of the worksheet, numbered to match the corresponding job step. For example:

Sequence of Steps	Potential Accidents or Hazards	Preventive Measures
1. Park vehicle.	1.a. Vehicle too close to passing traffic.	
	1.b. Vehicle on uneven, soft ground.	
	1.c. Vehicle may roll.	
2. Remove spare and tool kit.	2.a. Strain from lifting spare.	
3. Pry off hub cap and loosen lug bolts (nuts).	3.a. Hub cap may pop off and hit you.	
	3.b. Lug wrench may slip.	
4. and so on...	4.a.	

Again, all participants should jointly review this part of the analysis.

Determining preventive measures

The final stage in a JHA is to determine measures to eliminate or control the hazards identified. The generally accepted measures, in order of preference, are:

1. **Eliminate the hazard** - This is the most effective measure. These techniques should be used to eliminate the hazards:

   - Choose a different process.
   - Modify an existing process.
   - Substitute with less hazardous substance.
   - Improve environment (ventilation).
   - Modify or change equipment or tools.

Determining preventive measures
continued

2. **Contain the hazard** – If the hazard cannot be eliminated, injurious contact might be prevented by using enclosures, machine guards, worker booths or similar devices.

3. **Revise work procedures** – Consideration might be given to modifying steps which are hazardous, changing the sequence of steps or adding additional steps (such as locking out energy sources).

4. **Reduce the exposure** – These measures are the least effective, to be used only if no other solutions are possible. One way of minimizing exposure is to reduce the number of times the hazard is encountered. An example would be modifying machinery so that less maintenance is necessary. The use of appropriate personal protective equipment may be required. To reduce the severity of an accident, emergency facilities, such as eyewash stations, may need to be provided.

In listing the preventive measures, use of general statements, such as 'be careful' or 'use caution', should be avoided. Specific statements which describe both what action is to be taken and how it is to be performed are preferable. The recommended measures are listed in the right hand column of the worksheet, numbered to match the hazard in question. For example:

Sequence of Steps	Potential Accidents or Hazards	Preventive Measures
1. Park vehicle.	1.a. Vehicle too close to passing traffic.	1.a. Drive to area well clear of traffic. Turn on emergency flashers.
	1.b. Vehicle on uneven, soft ground.	1.b. Choose a firm, level area.
	1.c. Vehicle may roll.	1.c. Apply the parking brake; leave transmission in gear or in PARK; place blocks in front and back of the wheel diagonally opposite to flat.

Determining preventive measures
continued

Sequence of Steps	Potential Accidents or Hazards	Preventive Measures
2. Remove spare and tool kit.	2.a. Strain from lifting spare.	2.a. Turn spare into upright position in well. Using your legs and standing as close as possible, lift spare out of trunk and roll to flat tire.
3. Pry off hub cap and loosen lug bolts (nuts).	3.a. Hub cap may pop off and hit you.	3.a. Pry off hub cap using steady pressure.
	3.b. Lug wrench may slip.	3.b. Use proper lug wrench; apply steady pressure slowly.
4. and so on...	4.a.	4.a. .....

Conclusion

The method described here is for conducting a JHA by observing a worker actually performing the job. The major advantages of this method are that it does not rely on individual memory and the process stimulates recognition of hazards. For infrequently performed or new jobs, observation may not be feasible. With these, one approach is to have a group of experienced workers and supervisors complete the analysis through discussion. An advantage of this method is that more people are involved, allowing for a wider base of experience and promoting a more ready acceptance of the resulting work procedure. Members of the joint occupational and health committee should participate in this process.

Initial benefits from developing a JHA will become apparent in the preparation stage. The analysis process may identify previously undetected hazards and increase the job knowledge of those participating. Safety awareness is raised, communication between workers and supervisors is improved and acceptance of safe work procedures is promoted.

The completed JHA, or better still, a written work procedure based on it, can form the basis for regular contact between supervisors and workers on safety. It can serve as a teaching aid for initial job training and as a briefing guide for infrequent jobs. It may

Conclusion
continued

be used as a standard for safety inspections or observations and it will assist in completing comprehensive accident investigations.

JHA is a useful technique for identifying hazards so that measures can be taken to eliminate or control them. Once the analysis is completed, the results must be communicated to all workers who are, or will be, performing that job. The side-by-side format used in JHA worksheets is not an ideal one for instructional purposes. Better results can be achieved by using a narrative-style format. For example, the work procedure based on the partial JHA developed as an example in this document might start out like this:

1. Park vehicle.
   a. Drive vehicle off the road to an area well clear of traffic, even if it requires rolling on a flat tire. Turn on the emergency flashers to alert passing drivers, so that they will not hit you.
   b. Choose a firm, level area so that you can jack up the vehicle without it moving.
   c. Apply the parking brake, leave the transmission in gear or PARK, place blocks in front and back of the wheel diagonally opposite the flat. These actions will help prevent the vehicle from rolling.

2. Remove spare and tool kit.
   a. To avoid back strain, turn the spare up into an upright position in its well. Stand as close to the trunk as possible and slide the spare close to your body. Lift out and roll to flat tire.

3. Pry off hub cap, loosen lug bolts (nuts).
   a. Pry off hub cap slowly with steady pressure to prevent it from popping off and striking you.
   b. Using the proper lug wrench, apply steady pressure slowly to loosen the lug bolts (nuts) so that the wrench will not slip, hurting your knuckles.

4. and so on.

FURTHER READING

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Stearns, Fred. Job safety analysis gives steps to uncover accident causes. Power Press and Forging Newsletter (National Safety Council). Mar./Apr. 1984. p. 1-3

Supervisors safety manual : better production without injury and waste from accidents. 5th ed. Chicago, Ill. : National Safety Council, 1978. p. 89-97

ANNEX A – JOB HAZARD ANALYSIS WORKSHEET

JOB: _____

ANALYSIS BY _____ REVIEWED BY _____ APPROVED BY _____

DATE _____ DATE _____ DATE _____

Sequence of Steps	Potential Accidents or Hazards	Preventive Measures